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R E M A R K S

The Office Action issued December 3, 2009 has been received and its contents have been carefully considered.

The withdrawal of the prior rejection under 35 U.S.C. 103(a), as obvious over the combination of the following references, is noted with appreciation:

6,291,820 to Hamza et al.

6,989,528 to Schultz et al.

4,426,582 to Orloff et al.

3,508,045 to Liebl et al.

Van de Walle et al. article "Study of Bi... etc."  
Physical Review B, 35(11) 5509-5513 (1987)

Claims 1-7 have now been rejected, under 35 USC §103(a), as being unpatentable over the patent to Schulz et al. in view of the patents to Orloff et al. and Liebl et al., all previously cited. This rejection is respectfully traversed for the reasons given below:

1. Schultz et al.

As explained previously in applicants' Response dated July 24, 2009, Schultz et al. is generally concerned with MALDI, wherein the secondary ions are generated by a laser beam via laser desorption, not by a primary ion beam. See, for example, Col. 1, lines 18 and 26, Col. 5, lines 24 to 26, Col. 6, line 48 ("The present invention demonstrates MALDI-based measurements on gold-implanted samples") and also claim 1.

The Examiner refers to Col. 5, lines 46 to 47, Col. 5, lines 46 to 67, Col. 8, lines 48 to 67, Col. 9, lines 50 to 61, and Fig. 7 as teaching a SIMS as in the present invention, wherein a liquid metal primary ion source emitting a mixed primary ion beam containing metal clusters is used to generate secondary ion particles.

It is true that the paragraphs from Col. 5, lines 27 to 31, and Col. 5, line 46 to Col. 6, line 46, including the table in Col. 6 refer to SIMS. However, it must be noted that in the text before Col. 5, line 27, between Col. 5, lines 32 to 45, and after Col. 6, line 46, the whole document of Schultz et al., and in particular the claims, is only concerned with MALDI.

2. Schultz et al., Col. 5, line 45, to Col. 6, line 46

In this passage of Schultz et al., SIMS experiments are discussed using gold (Au) clusters as primary ions to generate secondary ions. Au is the only species used as the primary ion beam. Schultz et al. therefore provide nothing more than the previously acknowledged prior art on the use of Au primary ions in SIMS (see the "BACKGROUND OF THE INVENTION" portion of the present application).

The statement of the Examiner that Schultz et al. disclose "ion source (37) containing metal cluster ions..., for example, gold ions." is an over-statement and generalization of what is really disclosed in Col. 5, line 46 to Col. 6, line 46.

In order to extend this generalization from gold clusters to metal clusters, the Examiner refers to Fig. 7; Col. 8, lines 48 to 67; and Col. 9, lines 50 to 61. However, Fig. 7 and its description in Col. 8, line 48, to Col. 9, line 61, refer to a MALDI instrument, as can be understood from the presence of laser 7 for laser desorption of the ions to be analyzed, and for example, Col. 8, line 52, which refers to "gold cluster implantation".

In Col. 9, lines 50 to 56, it is mentioned that the instrument according to Fig. 7 could also be used as a SIMS, i.e. with Au ions as the primary ion beam. The reference in Col. 9, lines 57 to 61, mentions "that other ions may also be used and are within the scope of the present invention...". It thereby refers to the invention of Schultz et al., which is specifically applicable to MALDI (see claim 1, the Abstract, and also Col. 1, line 18).

Please also note that the primary ions recited in Col. 9, lines 57 to 61, are all well known primary ions, even in SIMS. The passage in Col. 9, lines 57 to 61, certainly does not go beyond well known prior art in SIMS. In Col. 9, lines 60 to 61, Schultz et al. recite other primary ions, such as aluminium, gallium, indium, which have a lower mass than gold ions. The listing of these primary ions provides no hint that a higher mass of primary ions would be beneficial for efficiency.

In other words, in Schultz et al. it is disclosed that the instrument in Fig. 7, using an Au ion source, can be used for MALDI and SIMS. For MALDI other ions may also be suitable.

In conclusion, therefore, to the extent that Schultz et al. teach a SIMS, it is with only an Au primary ion source.

3. Common meaning of the term "Efficiency"

As stated on page 7, last paragraph of applicants' Response dated July 224, 2009, the term "efficiency", in the context of this application refers to generated secondary ions per consumed target. For a further understanding of the term "efficiency", please refer to Fig. 3 and to page 10, line 16, to page 12, line 10, of the present application.

Fig. 3 shows the time or summed signal intensity of targets until the target is damaged by sputtering to the same extent. The summarized signal intensity is shown for all primary ion species of the above-mentioned type for an equal degree of destruction of the surface. The signal intensity achieved is thereby a standard for the efficiency of the analysis.

As can be seen from the upper row of Fig. 3, Bi clusters ( $\text{Bi}_3^{++}$ ,  $\text{Bi}_3^+$ ,  $\text{Bi}_7^{++}$ ) achieve signal intensities of  $2.6\text{E}5$  ( $2.6 \cdot 10^5$ ),  $2.8\text{E}5$ , and  $3.6\text{E}5$ , which are superior to the

signal intensities achieved with  $\text{Au}_1^+$ ,  $\text{Au}_3^+$ ,  $\text{Bi}_1^+$  of  $1.9\text{E}4$ ,  $1.8\text{E}5$ , and  $2.4\text{E}4$ .

The same holds true for the sample shown in the lower row of Fig. 3.

Under comparable conditions such higher efficiency leads to shorter measurement times and less target consumption until comparable signal intensities are reached.

This advantage of Bi clusters cannot be found, however, by isolated studies on the properties and characteristics of Bi metal sources. It can only be found when studying the interaction of a Bi primary ion beam with a target for sputtering secondary ions.

#### 4. Schultz et al. and Efficiency

The Examiner states that Schultz et al. teach "measuring efficiency of secondary ion emission for clusters sizes ranging from a singly charged single gold ion to multiply charged clusters..." (see paragraph 5(c) of the Office Action) and refers to Col. 5, lines 46 to 67, and Col. 9, lines 50 to 61.

However, Col. 5, lines 57 to 60, state: "The efficiency of  $\text{Au}^+$ ,  $\text{Au}_3^+$ ,  $\text{Au}_5^+$ ,  $\text{Au}_9^+$ , and  $\text{Au}_{[\text{nx}100]}^{n+}$  ... ion clusters as

primary beams for the secondary ion emission were examined."

This refers to Col. 6, lines 13 to 17: "Fig. 2 shows that the intact ion yield of gramicidin S increases with increasing the size of the cluster. This graph shows the yield enhancement as the size of the primary ion... increases...". The yield shown in Fig. 2 is the "gramicidin molecular ion signal per particle [of primary ions] as a function of equivalent gold deposited atoms," i.e., the secondary ion signal per primary Au ion.

This yield is also shown in the table in Col. 6, lines 41 to 46, as the molecular ion (secondary ion) signal normalized to dose, i.e. normalized to the intensity of the primary ion beam.

The term "efficiency" used by Schultz et al. in Col. 5, line 57, therefore designates the "yield" as mentioned in Col. 6, lines 13, 15, and 20.

In contrast to the Examiner's assumption, Schultz et al. by no means disclose or suggest any teaching as to the "efficiency of secondary ion production from the sample" as would be understood by a person skilled in the art and defined in the present invention, i.e. the secondary ion signal per consumed target material.

5. Summary of Schultz et al.

To summarize, Schultz et al. as far as it refers to

SIMS:

- is not concerned with target consumption, i.e. efficiency in its real meaning;
- does not show higher efficiency for higher mass of implanted ions (MALDI);
- does not show higher efficiency for higher mass of sputtering primary ions (SIMS);
- does not show any other primary sputtering ion than Au; and
- does not show Bi clusters.

Due to the much different MALDI technology, Schultz et al. is not a proper starting point from which to analyze inventiveness of applicants' independent claims 1 and 6.

6. Orloff et al.

The Examiner again refers to Orloff et al., which has also been discussed in detail in applicants' Response dated July 24, 2009.



Firstly, Schultz et al. uses MALDI-SIMS and Orloff does not refer to SIMS at all. Therefore, neither of these references or a combination of both references is suitable for evaluating the obviousness of the present invention.

Further, the Examiner is certainly incorrect in his statement that:

"Orloff teaches a liquid metal ion source having emitter 11B, which is coated with liquid metal, such as Bismuth, where the liquid metal attains a very intimate, uniform wetting of the material of the emitter. See Col. 4, lines 1-14; Col. 6, lines 12-31, and Col. 7, lines 62-67.

"Orloff modifies Schultz to provide a simple drawn tungsten field emitter coated with Bismuth, with a variable emission current over the nanoamp to microamp range shown in Figures 2A, 2B, and 3. See Col. 9, lines 53-59."

Orloff does not actually disclose a tungsten emitter coated with Bismuth for SIMS.

There is no teaching or suggestion in Orloff et al., available to a person skilled in the art, that Bismuth might be better than gold in MALDI or in SIMS.

Further, even if this would be assumed and Orloff et al. would be combined with Schultz et al., a MALDI would result, in which Bismuth ions or clusters were implanted into the matrix of the target, but not used for secondary ion

sputtering - which is done in MALDI by laser desorption/ionization.

7. Liebl et al.

Finally, the Examiner again refers to Liebl et al., which has also been discussed in applicant's Response of July 24, 2009. In particular, the Examiner reiterates his assumption that Liebl et al. disclose at Col. 7, lines 44 to 46 that, in order to generate the maximum number of secondary ions, the mass of the primary ions should be as large as possible.

In fact, Liebl et al. is the only cited reference which concerns the same basic SIMS technology as the present invention. However, Liebl et al. clearly show that a high electronegativity of the primary ion is of advantage for secondary ion sputtering.

In applicants' prior Response it was noted that Liebl et al. do not provide any information on the efficiency of secondary ion generation by primary ions but only on the intensity of beams of secondary ions.

8. Summary of Remarks

To summarize, the Examiner has withdrawn the rejection based on Hamza, Schultz, Orloff, and Liebl and has issued a new rejection based on only Schultz, Orloff and Liebl, using the same reasoning as before (see also page 4, line 9 of the Office Action which still mentions Hamza). In view of applicants' Remarks in the Response dated July 24, 2009, and for the reasons set forth above, applicants' claims are believed to distinguish patentably over these references.

9. Supplemental Information Disclosure Statement

In accordance with 37 CFR §1.56 and §1.97(b), the applicants wish to call the attention of the Examiner to the references listed on the attached Forms PTO/SB/08A and PTO/SB/08B. Copies of the non-US Patent references are submitted herewith.

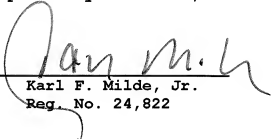
Also, for the information of the Examiner, submitted herewith are a Notice of Opposition to applicants' corresponding European patent No. EP 1,658,632 by ULVAC-PHI, Inc., and a copy of the opposor's brief, based on the references made of record herein.

10. Conclusion

For the reasons given above, this application is believed to be in condition for immediate allowance. A formal Notice of Allowance is accordingly respectfully solicited.

Respectfully submitted,

By



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